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557703 COMPLETE SPECIFICATION · GB-12/1943 1 SHEET

[This Drawing is a reproduction of the Original on a reduced scale.]

FIG. 2

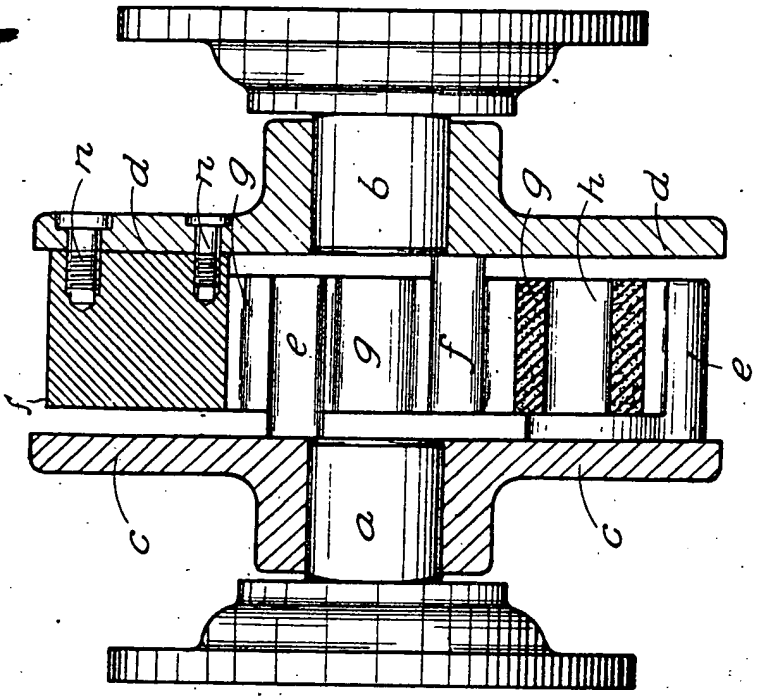
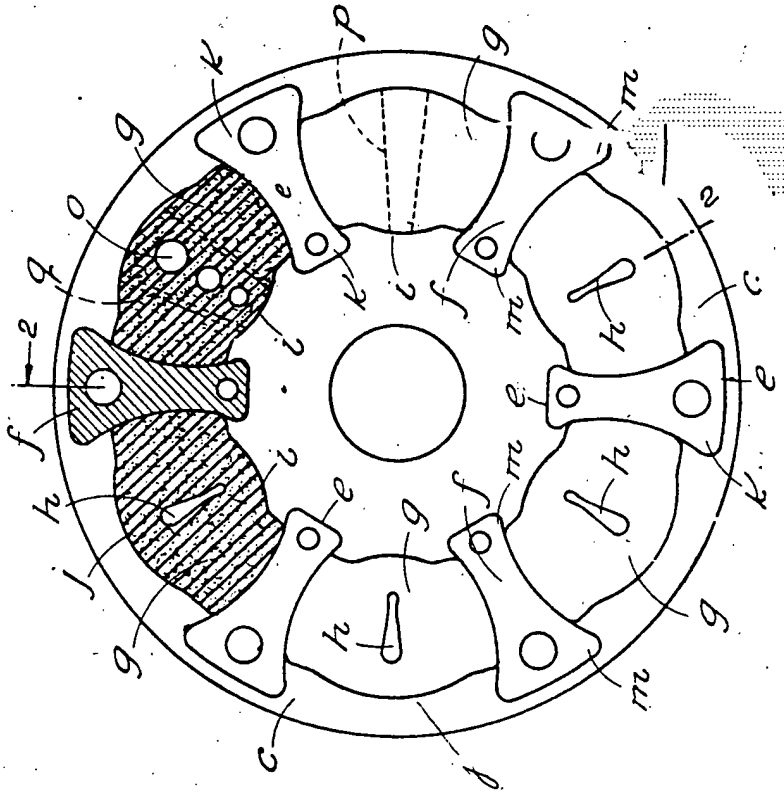


FIG. 1



Malby & Sons, Photo-Lith.

PATENT SPECIFICATION

Application Date: May 26, 1942. No. 7106/42.

557,703

Complete Specification Left: May 15, 1943.

Complete Specification Accepted: Dec. 1, 1943.

PROVISIONAL SPECIFICATION

Improvements in and relating to Shaft Couplings Employing Rubber and Metal Parts

We, METALASTIK LIMITED, a British Company, of Evington Valley Road, Leicester, MAX GOLDSCHMIDT, of German Nationality, and LUDWIG HEILBRUNN, of German Nationality, both of the Company's address, do hereby declare the nature of this invention to be as follows:—

The invention relates to couplings of the kind in which rubber elements are employed between flanges or parts associated with the two shafts to be coupled so as to provide a degree of elasticity in the coupling and permit of the satisfactory transmission of power when the shafts are out of alignment to some degree.

One of the objects of the present invention is to provide a satisfactory coupling for shafts that are out of alignment but maintained parallel to one another.

In an earlier patent specification No. 483,532 collars or flanges are provided with axially directed ribs on their opposed faces which are alternately arranged in a peripheral direction when the coupling is assembled, with the rubber elements secured by bonding to metal sheathing over the ribs and to the respective flanges in turn.

In accordance with the present invention in a similar assembly radial blocks are secured alternately to the flanges or equivalent parts of the respective shafts to be coupled, and rubber elements of a distinctive form are bonded to the faces of adjacent blocks in a manner which under increasing loading in compression allows of larger areas of the rubber being supported by the rigid faces of the blocks.

The rubber elements have each an opening or openings carried through it in an axial direction and the peripheral dimension of the opening or openings preferably increases with the radial distance from the shaft axis so that the expansibility of the element conforms with the degree of movement at any given radial distance. The shape of the opening or slot further ensures that the expansibility of the rubber element in compression due to malalignment is not impaired and thus minimises the bending forces exerted on the shafts.

The outer and inner surfaces of the median part of each rubber element are outwardly convex for the greater part of the surface, so that these parts of the element, where the opening or openings is (or are) carried through it, are of greater radial thickness in order to maintain an equal cross section of rubber. The inner and outer ends of the slot in each rubber element are preferably radiused.

The end faces of each rubber element where they are bonded to the radial blocks are overhung by the metal face of the block and these overhanging metal parts receive the rubber only as the latter expands in a radial direction under peripheral compression. For this purpose the blocks are preferably concavely curved on each face.

When assembled and bonded together the metal blocks and rubber intervening elements form a single unit which can be secured to the respective flanges of the two shafts by screw bolts.

This single compound unit may be a ring where the shafts are in positions which allow the ring to be inserted between the flanges. In other cases we form the single unit like a strap which can be united at its ends into a ring at the time of attachment to the shaft flanges.

For this purpose one of the metal blocks may be divided and the two parts be adapted to be assembled as a lap joint and secured by the bolts which hold the block to one of the shaft flanges. Locating projections and recesses between the lap jointed parts will serve to position them correctly, or we may provide a short groove in each in which a common key pin is inserted perpendicular to and lying between the aforesaid bolts. In either case the keying or locating means helps to relieve the bolts of shear strains when the coupling is under torsional load.

The arrangement provides a very flexible coupling permitting a degree of float or misalignment of the shafts and offering advantages of easy assembly in difficult conditions of use.

[illegible]

557,703

Dated this 24th day of April, 1942.

BARKER, BRETTELL & DUNCAN,
Chartered Patent Agents,
75 & 77, Colmore Row, Birmingham, 3.

COMPLETE SPECIFICATION

Improvements in and relating to Shaft Couplings Employing Rubber and Metal Parts

We, METALASTIK LIMITED, a British Company, of Evington Valley Road, Leicester, MAX GOLDSCHMIDT, of German Nationality, and LUDWIG HEILBRUNN, of German Nationality, both of the Company's address, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The invention relates to couplings of the kind in which rubber elements are arranged in a circular series and bonded to interposed metal abutments connected alternately to the two flanges or parts associated with the two shafts to be coupled so as to provide a degree of elasticity in the coupling and permit of the satisfactory transmission of power when the shafts are out of alignment to some degree. Such a rubber and metal coupling unit forms a continuous ring located about the axes of the shafts and due to this characteristic it suffers from the disadvantage that the distribution of stresses in the rubber elements at different radii is not wholly satisfactory.

One of the objects of the present invention is to provide a satisfactory coupling for shafts that are out of alignment but maintained parallel to one another.

In accordance with the present invention the rubber elements have each an opening or openings carried through it and the dimension in a circumferential direction of the opening or openings increases with the radial distance from the axis of the coupling so that the compressibility of the element conforms with the degree of movement at any given radial distance.

This characteristic of the opening or slot further ensures that the expansibility of the rubber element due to malalignment is not impaired and thus minimises the bending forces exerted on the shafts.

The outer and inner surfaces of the median part of each rubber element are preferably outwardly convex for the greater part of the surface, so that these parts of the element, where the opening (or openings) is (or are) carried through it, are of greater radial thickness in order to maintain an equal cross section of rubber. The inner and outer ends of the opening in each rubber element are preferably radiused.

The end faces of each rubber element where they are bonded to the radial blocks are preferably overhung by the metal face of the block and these overhanging metal parts receive the rubber only as the latter expands in a radial direction under circumferential compression. For this purpose the blocks may be concavely curved on each face.

The appended drawings illustrate the invention.

Figure 1 is an elevation of the elastic coupling with one flange and shaft removed and with two of the rubber elements and one metal block in section.

Figure 2 is a sectional elevation on line 2—2 of Figure 1. In these drawings *a* and *b* represent two shafts to be coupled and *c* and *d* are flanges or collars forming integral parts of the shafts or suitably secured thereto. The metal blocks are referred to by the letters *e* and *f* and the rubber elements by *g*. The metal blocks *e* are secured by the flange *c* and the blocks *f* to the other flange *d*. The openings in the rubber elements *g* are indicated at *h* and the increase in the circumferential dimension thereof as the radial distance from the common axis increases, is clearly shown. In the vicinity of the openings *h* which are preferably in the median part of the elements, each element is increased by convex bulges of the rubber on the inner and outer faces of the elements as shown at *i* and *j* respectively.

The two end faces of each rubber element are bonded by the now well known rubber to metal vulcanisation process to the opposed side faces of two metal blocks *e* and *f*. The respective metal blocks overhang the rubber as shown at *k* and *m* respectively. In the arrangement shown the metal blocks *e* and *f* are concavely curved on each face to receive the rubber element as it is spread radially under circumferential compression.

The metal blocks *e*, *f*, joined by the rubber elements *g* into a ring unit are secured to the collars or flanges *c*, *d*, by screws *n*. It is not essential that the opening or openings in the rubber elements

should be parallel to the axis of the ing or that there should be a single essively increasing opening such as e may, for example, use a series of openings such as at *o*, Figure 1, or l opening as indicated in dotted *p* in Figure 1.

y be desirable for some purposes in metal insertions or reinforce- for example, plates or strips or uze included during the moulding of t rubber elements. Such reinforce- me indicated at *q* in Figure 1 and if it is sed we may find it desirable to in- clude further openings near the bonded faces of the elements.

The openings *h* are radiused at the ends nearest and farthest from the axis of the coupling.

The arrangement provides a very flexible coupling in which the load transmitting rubber and metal parts permit a degree of float or misalignment of the shafts.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. Shaft couplings of the kind referred to in the opening lines of this specification wherein each rubber element has at least one opening carried through it, the circumferential dimension of which opening increases with the radial distance from the axis of the coupling.

2. Shaft couplings as claimed in Claim 1 wherein more than one opening is used in a radial series with the diameters progressively increasing with the radial distance from the axis of the coupling.

3. Shaft couplings as claimed in Claim 1 in which a single opening passes axially through each rubber element and gradually increases in width outwardly from the centre, each end preferably being radiused.

4. Shaft couplings as claimed in Claim 1 in which stiffening means are incorporated in the rubber elements to avoid excessive bulging and further openings are provided in the neighbourhood of the bonded surfaces.

5. Shaft coupling of the kind referred to in the opening lines of this specification constructed substantially as set forth herein in the description of the appended drawings.

Dated this 14th day of October, 1943.

BARKER, BRETTELL & DUNCAN,
Chartered Patent Agents,
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